

ON THE CORRECT APPLICATION OF RHIMPHOCTONA FOERSTER
(HYMENOPTERA: ICHNEUMONIDAE)

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ABSTRACT

An examination of the type-species of Rhimphoctona Foerster, R. grandis (Fonscolombe), has shown it to belong in Pyracmon Holmgren. The next available name in place of Rhimphoctona is Xylophylax Kriechbaumer. Pyracmon shares a common ancestor with the sister-pair of Xylophylax and Nemeritis.

INTRODUCTION

The Foerster genus Rhimphoctona was fixed by the inclusion of R. rufipes Tschek by Tschek in 1871. This species has subsequently become regarded as a junior synonym of R. grandis (Fonscolombe), 1852.

The characters of grandis were carefully examined in preparation for a revision of the nearctic species of Rhimphoctona which showed it to be different from all known species of this genus. Comparisons with species belonging to Pyracmon Holmgren showed that grandis has many features in common with this genus.

This paper presents an analysis of 12 characters and their character states and their distribution among grandis, Rhimphoctona, and Pyracmon and provides conclusions as to the correct application of the name Rhimphoctona.

RESULTS

Table 1 lists twelve characters and their character states as they are expressed among the various species of Rhimphoctona, Pyracmon, and grandis, and demonstrates their presence or absence in Pyracmon.

Table 2 shows the distributions of the character states (from table 1) among Pyracmon, grandis, and Rhimphoctona.

The species of Rhimphoctona (excluding grandis) can be clearly divided into two subgenera (subgenus 1 and subgenus 2 in table 2) which are named and described in the following paper.

Table 2 shows that grandis agrees entirely with Pyracmon but that it differs in a number of character states from species of Rhimphoctona. These similarities and differences are discussed below with respect to their phylogenetic significance and their value in assessing the systematic placement of grandis.

Table 1. Twelve selected characters and their character states as they are expressed among species of Rhimphoctona and Pyracmon with presence (+) or absence (-) in Pyracmon indicated.

Character	Character State	Presence or Absence in <u>Pyracmon</u>
1. Apical margin of antennal scape	Moderately oblique	+
	Strongly oblique	-
2. Vertex	Short	+
	Long	-
3. Clypeus	Broad (antero-lateral corners extend beyond tentorial pits)	+
	Narrow (antero-lateral corners not extending beyond tentorial pits)	-
4. Clypeus	Anterior margin produced medially as a small tooth	+
	Anterior margin not produced medially as a small tooth	-
5. Mandible	Long, weakly tapering	+
	Short, strongly tapering	-
6. Mandible	Lower tooth as long as or shorter than upper tooth	+
	Lower tooth longer than upper	-
7. Temple	Longest ventrally (near level of mandible)	+
	Longest medially (at mid-height of eye)	-
8. Petiolar seg. of abdomen	Short, stout	+
	Long, slender	-
9. Ovipositor	Depth at midlength at least 0.5 x the width of hind basitarsus, dorsal notch distinct	+
	Depth at midlength less than 0.5 x the width of hind basitarsus, dorsal notch indistinct	-
10. Ovipositor	Tip upturned	+
	Tip not upturned	-
11. Fore tibia	Apex produced as a small tooth externally	+
	Apex not produced as a small tooth	-

Table 2. continued

Character	Character State	Presence or Absence in <u>Pyracmon</u>
12. Face of Male	Entirely black	+
	Black with yellow markings	-

Table 2. Distribution of character states (from Table 1) among Pyracmon, Rhimphoctona, and R. grandis.

Character	Character States			
	<u>Pyracmon</u>	<u>grandis</u>	<u>Rhimphoctona</u> subgenus 1	<u>Rhimphoctona</u> subgenus 2
1	+	+	-, +	-
2	+	+	-	+
3	+	+	-	+
4	-	+	+	-
5	+	+	-	+
6	+	+	-	-
7	+	+	-	-
8	+	+	+, -	-
9	+	+	-	-
10	+	+	+	+
11	+	+	+	+
12	+	+	-	-

DISCUSSION

The following is an analysis of each of the twelve characters listed above, in the order that they appear in the tables. The analysis is based on the assumption that Pyracmon shares a common ancestor with the sister-pair of Rhimphoctona and Nemeritis and that Pyracmon is the more generalized group.

Character 1 demonstrates a fundamental difference between Pyracmon and Rhimphoctona. The apical margin of the antennal scape is strongly oblique in the latter and this is considered to be a derived state based on out-group comparisons with other Porizontinae, including the closely related genus Nemeritis. A character state similar to the postulated ancestral state found in Pyracmon and grandis is found in a small species-group (2 species) within subgenus one of Rhimphoctona. This is interpreted as being a character reversal.

Character 2 sheds no light on possible relationships as a short vertex is widely distributed among the Porizontinae and is therefore considered ancestral. The long vertex possessed by species of subgenus one of Rhimphoctona is a uniquely derived state.

The broad clypeus (character 3) possessed by all species of Pyracmon, grandis, and all species of subgenus two of Rhimphoctona is also observed in Nemeritis and is considered to be a shared derived feature indicative of a close relationship. The narrow clypeus of species of subgenus one of Rhimphoctona is a uniquely derived feature.

In character 4, the presence of a median tooth on the anterior margin of the clypeus in grandis appears to be a derived feature which links over to subgenus one of Rhimphoctona and has subsequently been lost in subgenus two and Nemeritis.

Weakly tapering mandibles (character 5) are widely distributed within the Porizontinae and are therefore considered ancestral and cannot be used to establish relationships. The short, strongly tapering mandibles of subgenus one of Rhimphoctona are unique and are probably an adaptation for chewing wood and or bark during emergence from twigs and logs (their hosts are sub-cortical coleopterous larvae).

Character 6 demonstrates another fundamental difference between Pyracmon and grandis, and Rhimphoctona. The lower tooth is longer than the upper tooth in all species of the latter genus, regardless of the length and taper of the mandible. The lower tooth of Pyracmon and grandis is as long or shorter than the upper tooth. This type of mandible is considered ancestral as it is widely distributed within the Porizontinae.

Character 7 illustrates another fundamental difference between Pyracmon and grandis, and Rhimphoctona. The temple of Rhimphoctona is unusually long in comparison with other Porizontinae, with its greatest length occurring opposite the mid height of the compound eye. The temple of grandis and all Pyracmon has its greatest length occurring at the level of the mandible.

The ancestral state of character 8 appears to be with the petiolar segment of the abdomen short and stout. Long petiolar segments have arisen twice in Rhimphoctona, once within a small species group within subgenus one (the same species-group discussed under character 1) and it is found in all species of subgenus two. This character cannot be used to establish relationships as the ancestral state is distributed among all three taxa being compared.

The ovipositor (character 9) exhibits two fundamental differences between Pyracmon and grandis, and Rhimphoctona. The ovipositor of Rhimphoctona is slender, with its depth at mid length less than half the width of the hind basitarsus, and with the dorsal notch indistinct. This type of ovipositor functions in the manner of a drill to reach a host larva. The ovipositor of Pyracmon and grandis has a depth at mid length which is greater than half the width of the hind basitarsus and the dorsal notch is distinct. This type of ovipositor is operated as a probe, which explains its relative stoutness. In Pyracmon, it is used to search out soil-dwelling elaterids (Barron, 1983).

Characters 10 and 11 show that the same character states are possessed by all the species of the groups being compared. These states (ovipositor tip upturned, apex of fore tibia produced as a small tooth) are considered to be derived with respect to most other porizontine genera (their occurrence elsewhere is considered to be convergence and is rare) and are indicative of a close relationship.

Character 12 appears to demonstrate another fundamental difference between Pyracmon and grandis, and Rhimphoctona. The faces of the males of all species of Rhimphoctona are marked with white or yellow except for a few highly melanic individuals of lucida (a palearctic species). The faces of all males of Pyracmon and grandis are entirely black. Black faces with white or yellow markings are considered to be derived states and have arisen several times within the porizontines.

The hosts of Pyracmon and Rhimphoctona were briefly discussed earlier. An account given by Ozols, 1928, indicates that the host of grandis is Saperda carcharias (Cerambycidae). This could be interpreted as evidence for placing grandis in Rhimphoctona if morphological evidence were ignored. No mention was made as to how grandis larvae were observed and a host-parasite association cannot be presumed in all certainty. It is possible that another sub-cortical species was acting as host, such as an elaterid. If the host association is correct, it could be interpreted as a transitional stage from one way of life to another (see below).

SUMMARY AND CONCLUSION

Table 2 shows that grandis shares all twelve character states with Pyracmon but shares similar character states with some Rhimphoctona in only seven characters. It differs from all Rhimphoctona in characters 1 (a similar character state in two species within subgenus one of Rhimphoctona is interpreted as being a character reversal), 6, 7, 9, and 12. The ancestral states of characters 2, 5, and 8 are distributed among all three taxa being compared (not all species) and cannot be used to infer relationships. Their derived states can be used to separate subgenera within Rhimphoctona and in one instance, a species-group within subgenus one. The ancestral state of character 3 (derived with respect to other Porizontinae) and the states expressed in characters 10 and 11 indicate the closeness of the relationship between Pyracmon, grandis, Rhimphoctona and Nemeritis.

The ancestral hosts of all four taxa are coleopterous larvae but some Nemeritis have switched to the sub-cortical larvae of Rhaphidiidae (Neuroptera).

The morphological evidence supports the view that Pyracmon is the most generalized of the three genera discussed in that it possesses many ancestral character states and few derived ones.

Morphological and biological evidence supports the view that Pyracmon shares a common ancestor with Rhimphoctona and Nemeritis.

Morphological evidence strongly supports the view that grandis belongs in Pyracmon and if biological observations are proven to be correct, then this species can be interpreted as being a link between Pyracmon and the Rhimphoctona-Nemeritis sister pair.

I herewith transfer grandis to Pyracmon based upon careful consideration of the evidence presented in this paper. This transfer results in the removal of Rhimphoctona as the generic name of the species previously included under it, and this means that Rhimphoctona, 1868 becomes a junior synonym of Pyracmon, 1859.

The next available name in place of Rhimphoctona Foerster is Xylophylax Kriechbaumer, 1878 (Type: Pyracmon (Parapyracmon) rufocoxalis Clément, designated by Townes, 1970). I have examined the type material of this species and found it to be conspecific with species previously included under Rhimphoctona.

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REFERENCES

- Barron, J. R., G. S. Walley. 1983. Revision of the holarctic genus Pyracmon (Hymenoptera: Ichneumonidae). Can. Ent. 115: 227-241.
- Foerster, A. 1868. Synopsis der Familien und Gattungen der Ichneumoniden. Verh. naturh. Ver. Rheinl. 25: 135-221.
- Fonscolombe, E. L. J. H., Boyer de. 1852. Ichneumonologie provençale ou catalogue des ichneumonides qui se trouvent aux environs d'Aix et description des espèces inédites. Ann. Soc. ent. France. (3) 2: 497-520.
- Holmgren, A. E. 1858. Conspectus generum Ophionidum Sueciae. Öfvers. Svenska Vetensk. Akad. Förh. 15: 321-330.
- Kriechbaumer, J. 1878. Bitte an die Ichneumonologen. Ent. Nachr. 4: 210-211.
- Ozols, E. 1928. Ichneumoniden aus bekannten Wirtstieren. Konowia. 7: 135-146.
- Townes, H. K. 1970. Genera of Ichneumonidae, Part 3. Mem. Amer. Ent. Inst., no. 13. p. 162.
- Tschek, C. 1871. Ichneumonologische Fragmente. I. Verh. zool.-bot. Ges Wien. 21: 37-68.